In the Claims:

Please cancel claims 1-3, 14-15, and 19-21, and amend claims 10, 11, 16-18 and 22 as follows:

1-3. (Cancelled)

4. (Currently Amended) The ~~structure of claim 3~~laser of claim 16, wherein said plurality of holes and said defect are finite depth holes formed in said top distributed Bragg reflector.

5. (Currently Amended) The ~~structure of claim 3~~laser of claim 16, wherein said plurality of holes ~~and~~ are finite depth holes that extend through said vertical cavity and extend through at least a part of each of said top and bottom distributed Bragg reflectors.

6. (Currently Amended) The ~~structure of claim 3~~laser of claim 16, wherein said plurality of holes ~~and~~ are infinite depth holes.

7. (Currently Amended) The ~~structure of claim 3~~laser of claim 16, comprising a plurality of defects arranged in said pattern.

8. (Original) The structure of claim 7, wherein said pattern comprises a seven point defect pattern.

9. (Original) The structure of claim 8, further comprises additional seven point defect patterns.

10. (Currently Amended) ~~The structure of claim 3,~~ A vertical cavity surface emitting laser, comprising:

a substrate;

a bottom distributed Bragg reflector;

a top distributed Bragg reflector;

an electrical current aperture;

top and bottom electrodes; and

a vertical cavity between said bottom and said top distributed Bragg reflectors containing an active region; wherein said vertical cavity includes:

a plurality of holes arranged in a plurality of patterns; and

at least one missing hole defect in each of said patterns, a ratio of the hole diameter divided by the hole pitch being dependent upon the hole depth and set to produce single transverse mode operation; ~~comprising a plurality of said patterns~~, wherein some of said patterns are different and some are matched to provide transverse optical coupling.

11. (Original) The structure of claim 10, wherein patterns are matched by having matched dimensions of said holes, pitch between holes, hole depth and defect radius.

12. (Currently Amended) The ~~structure of claim 3~~laser of claim 16, wherein said electrical current aperture comprises an oxidized region in said vertical cavity.

13. (Currently Amended) The ~~structure of claim 3~~laser of claim 16, wherein said electrical current aperture comprises an ion implanted region in said vertical cavity.

14-15. (Cancelled)

16. (Currently amended) ~~The laser of claim 15,~~ A vertical cavity surface emitting laser comprising:

a substrate;

a bottom distributed Bragg reflector;

a top distributed Bragg reflector;

an electrical current aperture;

top and bottom electrodes; and

a vertical cavity between said bottom and said top distributed Bragg reflectors containing an active region; wherein said vertical cavity includes:

a plurality of holes arranged in a pattern; and

at least one missing hole defect in the pattern, a ratio of the hole diameter divided by the hole pitch being dependent upon the hole depth and set to produce single transverse mode operation;

wherein a radius of said missing hole defect is set to achieve single mode operation; and

wherein dimensions are set such that the V-parameter of the laser is set such that V_{eff} is less than ~2.405, wherein V_{eff} is defined by:

$$V_{eff} = \frac{2\pi r}{\lambda}\sqrt{n_{eff}^2 - (n_{eff} - \gamma\Delta n)^2}$$

where λ is an operating wavelength, r is an equivalent defect radius, n_{eff} is the effective refractive index of the said vertical cavity without a photonic crystal hole pattern and defect structure present, Δn is the refractive index reduction introduced by the said pattern and said one or more defects, and γ is the depth dependence single transverse mode factor.

17. (Original) The laser of claim 16, wherein Δn is set through optimization to an increased amount that maintains V_{eff} is less than ~2.405.

18. (Original) The laser of claim 17, wherein Δn is set to be greater than 10^{-3}.

19-21. (Cancelled)

22. (Currently amended) ~~The structure of claim 20,~~ A photonic crystal defect structure in a vertical cavity surface emitting laser, comprising:

a substrate;

a bottom electrode electrically contacting said substrate;

a bottom distributed Bragg reflector formed on an opposite side of said substrate from said bottom electrode;

a top distributed Bragg reflector;

a plurality of finite depth holes arranged in a pattern and a missing hole defect in the pattern, the pattern being formed in at least a portion of said top distributed Bragg reflector, the

diameter, pitch and depth of the holes being defined by a depth dependence single transverse mode factor;

a vertical cavity including claddings that clad an active region, said vertical cavity being between said top and bottom distributed Bragg reflectors; and

a top electrode including an aperture larger than the pattern;

comprising a plurality of said patterns, wherein some of said patterns are different and some are matched to provide transverse optical coupling.

23. (New) A photonic crystal defect structure in a vertical cavity surface emitting laser, comprising:

a plurality of holes arranged in a pattern; and

at least one missing hole defect in the pattern, a ratio of the hole diameter divided by the hole pitch being dependent upon the hole depth and set to produce single transverse mode operation;

wherein a radius of said missing hole defect is set to achieve single mode operation; and

wherein dimensions are set such that the V-parameter of the laser is set such that V_{eff} is less than ~2.405, wherein V_{eff} is defined by:

$$V_{eff} = \frac{2\pi r}{\lambda}\sqrt{n_{eff}^2 - (n_{eff} - \gamma\Delta n)^2}$$

where λ is an operating wavelength, r is an equivalent defect radius, n_{eff} is the effective refractive index of the said vertical cavity without a photonic crystal hole pattern and defect structure present, Δn is the refractive index reduction introduced by the said pattern and said one or more defects, and γ is the depth dependence single transverse mode factor.